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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/586,606

07/19/2006

Yasuhiro Toida

8062-1039

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466 7590 10/21/2009

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EXAMINER

ROBINSON, RENEE E

ART UNIT

PAPER NUMBER

1797

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/586,606	<b>Applicant(s)</b> TOIDA, YASUHIRO	
	<b>Examiner</b> RENEE ROBINSON	<b>Art Unit</b> 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 July 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 18-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>See Continuation Sheet</u> .                                  | 6) <input type="checkbox"/> Other: _____                          |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :10/20/2006, 10/19/2006, 07/19/2006.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of group I, claims 1-14 and 18-20 in the reply filed on 27 July 2009 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

### ***Information Disclosure Statement***

2. The information disclosure statement filed 20 October 2006 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. It has been placed in the application file, but the information referred to therein has not been considered.

3. The letter submitted with the disclosure statement submits that the discussion in the specification satisfies the requirement for a concise explanation of relevance. However, Examiner is unable to find where in the specification the two documents cited in the IDS are discussed.

### ***Priority***

4. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 16 September 2004. It is noted, however, that applicant

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has not filed a certified copy of the JP 2004-269391 application as required by 35 U.S.C. 119(b).

5. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 02 February 2004. It is noted, however, that applicant has not filed a certified copy of the JP 2004-025047 application as required by 35 U.S.C. 119(b).

***Claim Rejections - 35 USC § 102***

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**7. Claims 1-6, 11-13, 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Toida (WO 2003/097771). Hereinafter, the WIPO document is cited from the English translation, US 2005/0173297.**

8. Regarding claim 1, Toida discloses a method for desulfurizing hydrocarbon oils comprising bringing a hydrocarbon oil containing at least one sulfur compound selected from the group consisting of thiophene compounds, benzothiophene compounds, and dibenzothiophene compounds or a hydrocarbon oil further containing aromatic hydrocarbons into contact with a solid acid catalyst and activated carbon (p. 2, par. 0012 and 0014; p. 7, par. 0084-0086). Toida does not expressly disclose activated carbon containing a transition metal oxide. Nevertheless, Toida still teaches all

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limitations required by claim 1 since the claim language specifically states "contact with a solid acid catalyst *and/or* activated carbon containing a transition metal oxide", which encompasses an embodiment in which the hydrocarbon oil is brought into contact with a solid acid catalyst and does not require activated carbon containing a transition metal oxide. As discussed above, Toida expressly teaches such an embodiment and therefore anticipates the material of claim 1.

9. Regarding claim 2, Toida discloses that the sulfur compounds contained in the hydrocarbon oil are reacted among themselves and/or with aromatic hydrocarbons by bringing the hydrocarbon oil into contact with the solid acid catalyst (p. 7, par. 0088).

10. Regarding claim 3, Toida discloses that the sulfur compounds in the hydrocarbon oil and heavy sulfur compounds produced by the reaction among the sulfur compounds contained in the hydrocarbon oil and/or by the reaction of the sulfur compounds with aromatic compounds are adsorbed by the solid acid catalyst and/or activated carbon (referred to as the adsorptive desulfurization agent) (p. 2, par. 0012-0015; p. 7, par. 0084-0086).

11. Regarding claims 4, 18 and 19, Toida teaches reducing the sulfur content of the hydrocarbon oils to 1 ppm or less (not more than 1 ppm) (p. 12, par. 0119).

12. Regarding claim 5, Toida discloses that the solid acid catalyst comprises a zeolite selected from the group consisting of proton-type faujasite zeolite, proton-type mordenite, and proton-type  $\beta$ -zeolite (p. 7, par. 0084-0086).

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13. Regarding claim 6, Toida teaches a silica/alumina ratio of the faujasite zeolite, mordenite, and  $\beta$ -zeolite of less than 100 mol/mol (i.e. not more than 10 mol/mol for faujasite and not more than 20 mol/mol for mordenite) (p. 7, par. 0086).

14. Regarding claim 11, Toida discloses that the hydrocarbon oil contains aromatic hydrocarbons as major components (p. 1, par. 0006-0007; p. 2, par. 0019; p. 7, par. 0088; Table 4).

15. Regarding claim 12, Toida discloses that the aromatic hydrocarbons include toluene (alkylbenzene having 7 carbon atoms) and aromatic compounds with two rings (naphthalene) (p. 2, par. 0019; p. 7, par. 0088).

16. Regarding claim 13, Toida teaches that the hydrocarbon oil is kerosene or gas oil (p. 2, par. 0018; p. 8, par. 0094).

### ***Claim Rejections - 35 USC § 103***

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**19. Claims 7, 14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toida (WO 2003/097771). Hereinafter, the WIPO document is cited from the English translation, US 2005/0173297.**

20. Toida is relied upon as set forth above in the rejection of claims 1, 5, 6 and 13.

21. Regarding claims 7 and 20, Toida does not expressly disclose that the content of cations other than proton in the faujasite zeolite, mordenite, and  $\beta$ -zeolite is 5 mass% or less. However, Toida teaches that the amount of protons in the solid acid zeolite affects the molar ratio of  $\text{SiO}_2/\text{AlO}_4$ , the acid strength, and the solid acid amount (p. 7, par. 0085). Therefore, the exact content of protons of the solid acid zeolite component is deemed to be a result effective variable with regard to the molar ratio of  $\text{SiO}_2/\text{AlO}_4$ , the acid strength, and the solid acid amount. It would require routine experimentation to determine the optimum value of a result effective variable, such as the exact content of protons, in the absence of a showing of criticality in the claimed proton (or cation) content. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). One of ordinary skill in the art would have been motivated by Toida to optimize the content of protons in the solid acid zeolite in order to provide an adsorptive desulfurization agent which provides the maximum adsorption of undesirable sulfur compounds.

22. Regarding claim 14, Toida teaches that the kerosene and gas oil may be demanded as a result of the widespread use of the fuel cell for automobiles or the like which carry the fuel cell of the onboard reforming type (p. 1, par. 0002; p. 8, par. 0094).



Therefore, while Toida does not expressly disclose that the kerosene or gas oil is desulfurized in the fuel cell vehicle, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to implement the desulfurization process of Toida in a fuel cell vehicle as claimed since Toida expressly suggests the high demand for low sulfur fuel for onboard reforming fuel cells.

**23. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toida (WO 2003/097771) in view of Imura et al (EP 1 142 636). Hereinafter, the WIPO document (Toida) is cited from the English translation, US 2005/0173297.**

24. Toida is relied upon as set forth above in the rejection of claim 1.

25. Regarding claims 8 and 9, Toida does not expressly disclose that the solid acid catalyst comprises a solid superacid catalyst selected from the group consisting of sulfated zirconia, sulfated alumina, sulfated tin oxide, sulfated iron oxide, tungstated zirconia, and tungstated tin oxide.

26. Imura teaches desulfurizing a light hydrocarbon oil by contacting the hydrocarbon oil with a superstrong acid catalyst comprising zirconium oxide (zirconia) and from 1 to 3 wt% sulfuric acid radicals (i.e.  $\text{SO}_4$  or sulfate) (Abstract; p. 3, par. 0012 and 0017).

Imura discloses examples in which the specific surface area of the catalyst is greater than  $100 \text{ m}^2/\text{g}$  (see Table 1). Imura teaches that the disclosed solid acid catalyst has activity in both hydrocarbon isomerization and desulfurization of organosulfur compounds, wherein isomerization of the hydrocarbon oil improves the octane number

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of the fuel, thereby improving engine performance in motor vehicles and aircraft (p. 2, par. 0002 and 0007).

27. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process of Toida by using a solid acid catalyst comprising a sulfated zirconia with a specific surface area of greater than 100 m<sup>2</sup>/g, as suggested by Imura, in order to provide both isomerization and desulfurization capabilities, thereby providing a fuel with a lower sulfur content and an improved octane number.

**28. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Toida (WO 2003/097771) in view of Takase et al (Abstract of JP 2-132186, as provided by Applicant). Hereinafter, the WIPO document (Toida) is cited from the English translation, US 2005/0173297.**

29. Toida is relied upon as set forth above in the rejection of claim 1.

30. Regarding claim 10, Toida does not expressly disclose contacting a hydrocarbon oil with activated carbon containing copper oxide.

31. Takase teaches a process to efficiently remove sulfur compounds containing organosulfur compounds by bringing a desulfurizing agent consisting of active carbon supporting copper oxide into contact with a sulfur compound-containing hydrocarbon oil (see Abstract).

32. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the process of Toida by using an activated carbon containing copper oxide, as suggested by Takase. One having ordinary skill would

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have been motivated to do this because Takase teaches that activated carbon containing copper oxide efficiently removes organosulfur compounds from hydrocarbon oils.

### ***Double Patenting***

33. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

34. Claims 1-4, 8, 9, 13, 18 and 19 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-7 and 15-18 of copending Application No. 11/997,608. Although the conflicting claims are not identical, they are not patentably distinct from each other because both applications claim a method of desulfurization of hydrocarbon oil (i.e. kerosene) comprising bringing

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a hydrocarbon oil containing benzothiophenes and dibenzothiophenes into contact with a solid acid catalyst and activated carbon.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RENEE ROBINSON whose telephone number is (571)270-7371. The examiner can normally be reached on Monday through Thursday 7:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on (571)272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. R./  
Examiner, Art Unit 1797

/Walter D. Griffin/  
Supervisory Patent Examiner,  
Art Unit 1797